



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/754,486	01/03/2001	Stephen Temple	27754/X254A	4903
4743	7590	06/15/2004		
			EXAMINER	
			STAICOVICI, STEFAN	
			ART UNIT	PAPER NUMBER
			1732	

DATE MAILED: 06/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/754,486	TEMPLE ET AL.
	Examiner	Art Unit
	Stefan Staicovici	1732

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 05 April 2004.

2a) This action is **FINAL**. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 9,23-25,31,34 and 35 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) Claim(s) _____ is/are allowed.

6) Claim(s) 9,23-25,31,34 and 35 is/are rejected.

7) Claim(s) _____ is/are objected to.

8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. _____.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____

4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ .

5) Notice of Informal Patent Application (PTO-152)

6) Other: ____ .

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on November 23, 2003 has been entered.

Response to Amendment

2. Applicants' amendment filed April 5, 2004 has been entered. Claims 9, 23 and 31 have been amended. Claims 1-8, 10-22, 26-30 and 32-33 have been canceled. Claims 9, 23-25, 31 and 34-35 are pending in the instant application.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 9 and 34-35 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter that was not described in the specification in such a way as to reasonably convey to one

skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In claim 9, the limitation that the beam is “inverted” and directed “along an axis collinear with said first axis” by reflecting the beam off a “planar reflecting surface” and a “at least two additional beam reflecting surfaces” is not clear to one ordinarily skilled in the art. According to Figure 5a and the original specification at page 12, line 12 through page 13, line 25, it appears that inversion of the laser beam can occur only when reflecting the laser beam off three reflecting surfaces. Further, it should be noted that inversion of the beam could not occur when using *four* (emphasis added) reflecting surfaces. Further clarification is required. Claims 34-35 are rejected as dependent claims.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 9, 23-24 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiwaki *et al.* (US Patent No.5,263,250) in view of Shei *et al.* (US Patent No. 5,569,238) and in further view of GB 2 262 253 A.

Nishiwaki *et al.* ('250) teach the basic claimed apparatus and process for forming nozzles in a nozzle plate for an inkjet print head including, splitting a laser beam (3) into

a plurality of secondary beams using a system of prisms and a flyeye lens (4), hence introducing a divergence into the secondary beams, whereas the origin of divergence being apart from the point where beam splitting occurs (see Figure 2), followed by a process of recombining and directing the secondary beams, using a convergent lens, toward a single aperture of a mask as defined by a light transmissible portion as shown in Figure 5, whereas the resulting light spot is made to coincide to with the light transmissible portion (aperture) of the mask (see col. 4, lines 54-56).

Regarding claims 9, 23-24 and 31, Nishiwaki *et al.* ('250) does not teach directing the laser beam to a first reflecting surface and then to at least two additional beam reflecting surfaces that are rotating as an assembly such as to invert the beam in a collinear direction. Shei *et al.* ('238) teach an optical homogenizer system including a first, second and third reflecting means (discrete members) that rotate (130) (see col.4, lines 53-57). It should be noted that because the optical homogenizer system reshapes and homogenizes the beam in a circular fashion that said homogenizer rotates. Further, it should be noted that because the optical homogenizer system of Shei *et al.* ('238) includes a similar structure as claimed, specifically three rotating reflecting surfaces placed at an angle to the incoming beam, then it is submitted that the outgoing laser beam of Shei *et al.* ('238) is inverted. Therefore, it would have been obvious for one of ordinary skill in the art to have provided an optical homogenizer system including a first, second and third reflecting means that rotate as taught by Shei *et al.* ('238) in the process of Nishiwaki *et al.* ('250) because, Shei *et al.* ('238) specifically teach that such a homogenizer reshapes and homogenizes the beam in a circular fashion, hence improving

the quality of the resulting nozzles. It should be noted that the apparatus of Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) teach a nozzle plate substrate and a beam homogenizer.

Further regarding claims 9, 23-24 and 31, Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) do not teach forming a reverse tapered hole (directing said beam at said substrate such that said beam first impinges upon the face of the nozzle plate in which said nozzle outlet is formed...nozzle inlet is larger in diameter than nozzle outlet). GB 2 262 253 A teaches a laser drilling process including rotating a laser beam about the polar axis of a fixed spherical lense by rotating an optical assembly that reflects the laser beam between an outer mirror (11) and an inner mirror (14) such that a reversed tapered hole is formed (see Abstract). Further, it is noted that the optical assembly in the process of Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238), hence the laser beam, is also rotated. Therefore, it would have been obvious for one of ordinary skill in the art, in view of the teachings of GB 2 262 253 A, that upon rotation of the laser beam assembly as taught by GB 2 262 253 A in the process of Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) to have obtained a reverse tapered hole, because GB 2 262 253 A specifically teaches that rotation of the laser beam forms a reverse tapered hole, whereas Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) teach rotating of the optical assembly and hence, rotating the laser beam.

7. Claims 9, 23-24 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiwaki *et al.* (US Patent No.5,263,250) in view GB 2 262 253 A.

Nishiwaki *et al.* ('250) teach the basic claimed apparatus and process for forming nozzles in a nozzle plate for an inkjet print head including, splitting a laser beam (3) into a plurality of secondary beams using a system of prisms and a flyeye lens (4), hence introducing a divergence into the secondary beams, whereas the origin of divergence being apart from the point where beam splitting occurs (see Figure 2), followed by a process of recombining and directing the secondary beams, using a convergent lens, toward a single aperture of a mask as defined by a light transmissible portion as shown in Figure 5, whereas the resulting light spot is made to coincide to with the light transmissible portion (aperture) of the mask (see col. 4, lines 54-56).

Regarding claims 9, 23-24 and 31, Nishiwaki *et al.* ('250) does not teach directing the laser beam to a first reflecting surface and then to at least two additional beam reflecting surfaces that are rotating as an assembly such as to invert the beam in a collinear direction. GB 2 262 253 A teaches a laser drilling process including rotating a laser beam about the polar axis of a fixed spherical lense by rotating an optical assembly including, an inner mirror (14) having two reflecting surfaces and an outer mirror (11) having two reflecting surfaces (see Figure 4), that rotate and reflect the laser beam such that a reversed tapered hole is formed (see Abstract). Further, it should be noted that because the optical assembly of GB 2 262 253 A includes a similar structure as claimed, specifically a first reflecting surface and at least two additional reflecting surfaces placed at an angle to the incoming beam, then it is submitted that the outgoing laser beam of GB 2 262 253 A is also inverted. Therefore, it would have been obvious for one of ordinary skill in the art to have provided a rotating optical assembly having a first reflecting

surface and at least two additional beam reflecting surfaces that are rotating as an assembly as taught by GB 2 262 253 A in the process of Nishiwaki *et al.* ('250) because, GB 2 262 253 A teaches that such an assembly provides for reverse tapered holes, hence improving process versatility by allowing drilling of preformed surfaces in which the undersurface is not accessible. It should be noted that the system of Nishiwaki *et al.* ('250) in view of GB 2 262 253 A teach a nozzle plate substrate and a beam rotational-inverter.

8. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiwaki *et al.* (US Patent No.5,263,250) in view of Shei *et al.* (US Patent No. 5,569,238) and in further view of GB 2 262 253 A and Daly (US Patent No. 4,316,074).

Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) and further view of GB 2 262 253 A teach the basic claimed process as described above.

Regarding claim 25, although Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) and further view of GB 2 262 253 A teach reflective means, Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) and further view of GB 2 262 253 A do not specifically teach dielectric mirrors. Daly ('074) teaches the use of high reflectance dielectric mirrors (see col. 6, lines 30-35). Therefore, it would have been obvious for one of ordinary skill in the art to have used the high reflectance dielectric mirrors of Daly ('074) in the process of Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) and further view of GB 2 262 253 A because, Daly ('074) teaches that such mirrors have a 99% reflectance rate, whereas the process of Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) and further view of GB 2

262 253 A requires reflective means for homogenizing the beam, hence improving process quality.

9. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiwaki *et al.* (US Patent No.5,263,250) in view of GB 2 262 253 A and in further view of Daly (US Patent No. 4,316,074).

Nishiwaki *et al.* ('250) in view of GB 2 262 253 A teach the basic claimed process as described above.

Regarding claim 25, although Nishiwaki *et al.* ('250) in view of GB 2 262 253 A teach reflective surfaces , Shei *et al.* ('238) do not specifically teach dielectric mirrors. Daly ('074) teaches the use of high reflectance dielectric mirrors (see col. 6, lines 30-35). Therefore, it would have been obvious for one of ordinary skill in the art to have used the high reflectance dielectric mirrors of Daly ('074) in the process of Nishiwaki *et al.* ('250) in view of GB 2 262 253 A because, Daly ('074) teaches that such mirrors have a 99% reflectance rate, whereas the process of Nishiwaki *et al.* ('250) in view of GB 2 262 253 A requires reflective means for reflecting and inverting the beam, hence improving process quality.

10. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiwaki *et al.* (US Patent No.5,263,250) in view of Shei *et al.* (US Patent No. 5,569,238) and in further view of GB 2 262 253 A and Hizny (US Patent No. 5,048,938).

Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) and further view of GB 2 262 253 A teach the basic claimed process as described above.

Regarding claim 35, although Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) and further view of GB 2 262 253 A does not teach the use of a second mask interposed between the first mask (8) and the beam converging lens (10), the use of multiple masks to process a laser beam is well known in the art as evidenced by Hizny ('938) which teaches that "cleaning" of the beam occurs by using a spatial filter (mask) (see col. 1, lines 10-15). Therefore, it would have been obvious for one of ordinary skill in the art to have interposed a second mask (spatial filter) as taught by Hizny ('938) in the process of Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) and further view of GB 2 262 253 A because, Hizny ('938) specifically teaches that using a spatial filter (mask) allows "cleaning" of the laser beam prior to its impingement on the target, hence improving product quality and also because Hizny ('938) specifically teaches that the use of spatial filters is well known.

11. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiwaki *et al.* (US Patent No.5,263,250) in view of GB 2 262 253 A and in further view of Hizny (US Patent No. 5,048,938).

Nishiwaki *et al.* ('250) in view of GB 2 262 253 A teach the basic claimed process as described above.

Regarding claim 35, although Nishiwaki *et al.* ('250) in view of GB 2 262 253 A does not teach the use of a second mask interposed between the first mask (8) and the beam converging lens (10), the use of multiple masks to process a laser beam is well known in the art as evidenced by Hizny ('938) which teaches that "cleaning" of the beam occurs by using a spatial filter (mask) (see col. 1, lines 10-15). Therefore, it would have

been obvious for one of ordinary skill in the art to have interposed a second mask (spatial filter) as taught by Hizny ('938) in the process of Nishiwaki *et al.* ('250) in view of GB 2 262 253 A because, Hizny ('938) specifically teaches that using a spatial filter (mask) allows "cleaning" of the laser beam prior to its impingement on the target, hence improving product quality and also because Hizny ('938) specifically teaches that the use of spatial filters is well known.

Allowable Subject Matter

12. Claim 34 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, first paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Response to Arguments

13. Applicants' arguments filed November 24, 2003 have been considered but are moot in view of the new grounds of rejection(s).

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stefan Staicovici, Ph.D. whose telephone number is (571)

272-1208. The examiner can normally be reached on Monday-Friday 9:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael P. Colaianni, can be reached on (571) 272-1196. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Stefan Staicovici, PhD


Primary Examiner 6/13/04

AU 1732

June 13, 2004